

Standard 5: Humans and Natural Resources

The student will use concepts from chemistry, physics, biology, and ecology to analyze and interpret both positive and negative impacts of human activities on earth's natural systems and resources.

A. Human Impact on Natural Processes

Indicator 1: Analyze the effects of human activities on earth's natural processes.

- a. Explain that human populations are part of the earth's ecosystems, use natural systems, and will continue to use natural systems, as resources in order to maintain and improve their existence.
- b. Identify and describe that natural ecosystems provide an array of basic processes that affect humans, including:
 - maintenance of the quality of the atmosphere
 - generation of soil
 - control of the hydrologic cycle
 - disposal of wastes
 - recycling of nutrients
- c. Investigate and explain that humans modify ecosystems as a result of:
 - Population growth
 - Technologies having to do with food production, sanitation, and disease prevention
 - Increasing human consumption that places severe stress on natural processes that renew some resources and depletes those resources that cannot be renewed
- d. Give examples and describe how natural systems have the capacity to reuse waste, but that capacity is limited.
- e. Give examples of materials from human societies that affect both the physical and chemical cycles of earth.
- f. Investigate, analyze and explain how human impacts threaten current global stability and if not addressed, will irreversibly affect earth's systems.
- g. Investigate, analyze and explain how ecological forecasts are used to predict the impacts of chemical, biological, and physical changes on ecosystems, ecosystem components, and people.

Indicator 2. Analyze the effects of human activities that deliberately or inadvertently alter the equilibrium of natural processes.

- a. Investigate and explain how human activity may alter the equilibrium of natural processes:
 - maintenance of the quality of the atmosphere.
 - generation of soils
 - control of the hydrologic cycle
 - disposal of wastes
 - recycling of nutrients
 - changing the rate at which matter recycles
- b. Evaluate the effects on the environment of human activities that result from the acquisition, transport, distribution and use of energy resources.
- c. Use data to show that a growing human population is removing resources faster than they can be replaced by natural processes.
- d. Evaluate the effects or the possible effects of the introduction of alien species either intentionally or unintentionally into the Chesapeake Bay and surrounding watershed and the results this has or may have on the natural resources found in the Bay.

B. Human Impact on Natural Resources

Indicator 1. Analyze, from local to global levels, the relationship between human activities and the earth's resources.

- a. Evaluate the interrelationships between humans and water.
- b. Evaluate the interrelationships between humans and the ocean.
- c. Evaluate the interrelationships between humans and land, including urban growth and land-use decisions.
- d. Evaluate the interrelationships between humans and air quality.
- e. Evaluate the interrelationships between humans and energy resources.
 - Sunlight is the ultimate source of energy.
 - When selecting an energy source, it is important to identify advantages and disadvantages of each source.
 - During any energy transformation, there is some dissipation of energy into the environment.
- f. Recognize and explain that activities and technology of the human species have a major impact on other species in many ways such as:
 - Decreasing the amount of available space (land use) or food for other organisms
 - Destruction of habitats through direct harvesting, pollution, atmospheric change

- Removing or moving a species from one ecosystem to another
- Changing the temperature and chemical composition of habitats
- Altering organisms through selective breeding and genetic engineering

g. Analyze ways that humans are changing many basic ecosystem processes and explain that the changes may have a major impact on their own species in many ways.

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